Engineering Management
Field Project

Product Feasibility Plan for Embraer ERJ-170/190 Regional Jet Coffee Maker

By

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PREFACE

NOTICE – ALERT TO MODIFICATIONS!

This report has been modified from original form to remove proprietary and confidential information. Product type, names, locations, and specific identifiying information has been changed and replaced with generic information. Additonally, numbers have been changed by multiplication by an undisclosed constant.

PRODUCT FEASIBILITY PLAN FOR EMBRAER ERJ-170/190 REGIONAL JET COFFEE MAKER

AARON D. KUEHL

Executive Summary

XYZ Company (XYZ) is an aerospace parts manufacturer based in City, State, which specializes in appliance products for large commercial aviation and the US Department of Defense. XYZ has been in a growth phase since the 2001 aviation downturn, and now has a XX% market share of coffee maker sales for large commercial aviation, making it the number three supplier to this market segment. XYZ's success in this market segment was a primary factor in the acquisition of XYZ in December 2008, by ABC, Inc. The acquisition has provided XYZ with greater financial resources to draw upon, and combining ABC's and XYZ's products has reshaped the playing field in aviation appliances, by narrowing the competition to a three company race – Competitor A, Competitor B and ABC-XYZ. All three companies now have similar sizes, roughly $X.XB to $X.XB market cap, and thus have similar resources to devote to improving their market share in the aviation appliance market.

Competitor A is firmly entrenched as the number one supplier to the aviation appliance market, due to a long history of OEM contracts and a high-quality, well-designed product line. As a result, Competitor A has a greater than XX% market share, and is able to charge a premium price for its products, making them vulnerable to competition from lower-cost providers. Competitor B is the next largest market share supplier to this market and has approximately a XX% market share, and competes with Competitor A on the basis of price, by offering a lower-quality product. ABC-XYZ (XYZ) has the smallest market share of the three companies, but has been very successful in applying it's lowest-cost, high-quality approach to the large commercial aviation market segment, resulting in growth from X% to XX% market share during 2003 to 2008. XYZ has accomplished this primarily by aligning itself with airlines that employ the complementary low-cost business model, and developing strong relationships with airline personnel, including: buyers, PMA-coordinators, engineers, and maintenance personnel. XYZ feels strongly that through a combination of new financial resources and new products, and application of its proven business approach, it can overtake Competitor B and become the number two supplier to the aviation appliance market.

To enable its continued growth, XYZ has identified the Regional Jet coffee maker market segment as an attractive market segment that could aid XYZ in its goal of becoming the

number two supplier in aviation appliances. The Regional Jet market segment is dominated by two manufacturers – Bombardier and Embraer. XYZ has strong ties with several airlines that operate Embraer Regional Jets, and believes it can leverage these airline relationships to quickly enter the Embraer coffee maker market. Unfortunately, XYZ has only limited knowledge of this market, current products and the market potential, and needs more information to make an informed business decision of how to proceed with this product. This product feasibility plan will outline the recommended approach XYZ should use to effectively enter the Embraer coffee maker market for the ERJ-170/190 aircraft.

Strategic Objectives

The business objectives for the Embraer ERJ-170/190 coffee maker product is to secure an initial 36% market share of the existing fleet, and grow this by acquiring 24.8% of new deliveries for the next 8 years, while maintaining a net income greater than 25% of sales. Additionally, XYZ would like to use this product platform to establish itself as the highest-value coffee maker supplier to the growing regional jet market, and fill an empty category in XYZ's aviation appliance product offering.

Target Customers

Launch Customer:	Airline X – City, Country
	Yearly Sales Potential: 106 Units
Primary Customers:	Airline Z – City, Country
	Yearly Sales Potential: 72 Units
	Airline Y – City, Country
	Yearly Sales Potential: 72 Units
	Airline W – City, Country
	Yearly Sales Potential: 120 Units
Secondary Customers:	Airline V, Airline U, Airline T, Airline S, Airline R
	Combined Total Yearly Potential: 376 Units

Market Analysis

Cost challenges for airlines increasing. Products with lower purchase prices, and that decrease fuel usage have an increased competitive advantage in purchasing decisions.

Low-cost airline model is rapidly growing. The low-cost airline model aligns naturally with the XYZ marketing approach of low-cost, high-quality products.

Regional jet fleet will double in size over the next decade. Embraer is forecasted to be the market leader in this segment, capturing 40.1% of the new deliveries, and combining this growth with low competition for the coffee maker business, makes this market segment an attractive growth market.

FAA-PMA acceptance is increasing. FAA-PMA part cost advantage and widespread acceptance provides and attractive alternative for cost-conscious airlines.

Positioning, Value Proposition (Benefits)

- **Lower Part Price.** Because of its 25% lower price than the nearest competitor, XYZ's coffee maker will save customers $2900 to $7940 per aircraft per year.
- **Lower Weight Decreases Operational Costs.** XYZ's weight decrease of 3 lbs/plane over competitors' products will decrease yearly fuel consumption by 508 gallons, saving operators $1010 per aircraft per year in fuel expenses.
- **Industry Leading Quality –** XYZ leads the industry in product quality, as it is the only supplier that tests its coffee makers 100% to ensure they meet performance specifications, and has had zero in-service failures during the last decade.
- **Industry Leading Customer Service and Support –** XYZ is "big enough to matter, and small enough to care", and this is exemplified in our first class customer service and support via a combination of 24/7distributor support and XYZ direct relationships. Our distributors maintain inventories worldwide, and have parts available in 24hrs or less 95% of the time, ensuring AOG and maintenance downtime is avoided.

XYZ Product Features

- **Increased Coffee Holding Capacity** - Longer life for reduced operating cost.
- **Lighter Weight** – Save fuel, for greener, lower-cost operations.
- **100% functionally tested** - Rest assured your customers are drinking the finest coffee possible, every time.
- **Superior Packaging** – Parts arrive intact, allowing inventory levels to be minimized.
- **FAA-PMA Approved** – FAA approval frees up engineering resources for other tasks.

Sales and Marketing Strategy

Airlines will buy the product from XYZ's distributors AAA and BBB, and XYZ will guide and support sales activity via its internal sales staff. The Ascend database will be utilized to identify fleet ownership and to monitor fleet operational hours, and this information will be used to target airlines that XYZ has current relationships with and those with substantial fleets. Customers will be targeted, using a sales progression strategy that builds on early successes. **After launching the product with Airline X in late 2009, sales will first focus on airlines with existing relationships, and then extend to new customers in 2011-2013.**

A prototype of the product will be showcased by **AAA at the 2009 Paris Air show, and actual product will be displayed by AAA at the 2010 Singapore Air show and London Air show to develop market awareness of the product.** Leads for new customers will be generated via attendance in aviation purchasing and maintenance conferences including the ACPC and CCMA shows. Product training will be conducted with all sales personnel at AAA and BBB, as well as conducting co-visits to airlines for new sales, continuing the relationship based selling approach XYZ has successfully utilized in the large commercial aviation appliance market segment. Traditional collateral material will be available, including a product catalog, marketing brochures, data pack, and inclusion online at www.XYZ.com.

Financial/Business Case

Estimates are based on sales to Airline W, Airline Y, Airline Z and Airline X of 370 units in 2009, with unit sales increasing at a yearly rate of 15.4% a year for the period of 2010 to 2017. This is a conservative estimate, as it is based on applying XYZ's historic growth rate in coffee maker sales for the period of 2002-2008 to new airplane deliveries only. At **$4350 proposed retail price,** forecasted sales revenue is **$134,120** per month in 2010. Development costs for the product are estimated at $516,830, and capital equipment purchases required for product launch are estimated at $110,450. The product is **projected to show profitability by September 2010, with a NPV of $2,352,350 using a conservative discount rate of 20%, and an IRR of 129%.**

Competitive Products

XYZ's product is unique in that it offers the best value for this application, as it has the lightest weight and price resulting in the lowest operating costs, and has the longest life and quality on par with the higher priced OEM product. Competitors for aftermarket sales are Competitor C (Competitor A) and Competitor B, with prices of $832 and $580, respectively. The closest competing product is the Competitor B coffee maker, as design and performance is similar, but XYZ's quality and packaging is superior. The Competitor C coffee maker manufactured by Competitor A, is the market leader, due to its OEM status and higher quality components, but is vulnerable to lower cost competition. **XYZ's primary advantage will be it's lower sales price and lower weight, which combine to reduce yearly operating costs of the Embraer ERJ-170/190 aircraft by $3910 to $8950.**

Product Schedule

The product development schedule estimate is a **development period lasting eight months, starting in May 2009 and concluding with FAA-PMA approval in December 2009.** The schedule is achievable utilizing existing personnel, with a probability of on-time completion of 67% when compared to completion times of similar products in the last three years.

Conclusions & Recommendations

This product feasibility plan concludes that:

1. There is a sizeable market for the product, and customer alignment exists with XYZ's high-value sales philosophy.
2. The product is extremely attractive financially – high NPV, rapid payback and not sensitive to discount rate.
3. XYZ can leverage its existing airline relationships to secure rapid product placement.
4. XYZ can offer a superior product, preventing price-only competition and the high-margin allows for profitability to be maintained if price does erode.
5. The product requires minimal capital equipment investment, decreasing investment risk, and improves utilization of existing assets.

Based on the conclusions reached during development of this feasibility plan, it is recommended that XYZ:

1. **Fund this project and begin Development in May 2009.**
2. Conduct full-blown marketing study to validate market potential, and improve market knowledge.
3. Develop detailed project schedule, identifying critical path and resource requirements to ensure launch deadline of January 1, 2010 is met.

Table of Contents

1. Introduction/Background

XYZ Company (XYZ) is an aerospace parts manufacturer based in City, State, which specializes in appliance products for large commercial aviation and the US Department of Defense. XYZ has been in a growth phase since the 2001 aviation downturn, and now has a XX% market share of coffee maker sales for large commercial aviation, making it the number three supplier to this market segment. XYZ's success in this market segment was a primary factor in the acquisition of XYZ in December 2008, by ABC, Inc. The acquisition has provided XYZ with greater financial resources to draw upon, and combining ABC's and XYZ's products has reshaped the playing field in aviation appliances, narrowing the competition to a three competitor race – Competitor A, Competitor B and ABC-XYZ (Johnson, 2009). All three competitor's parent companies now have similar sizes, roughly $X.XB to $X.XB market cap, and thus have similar resources to devote to improving their market share in the aviation appliance market.

Competitor A is firmly entrenched as the number one supplier to the aviation appliance market, due to a long history of OEM contracts and a high-quality, well-designed product line. As a result, Competitor A has a greater than XX% market share, and is able to charge a premium price for its products, making them vulnerable to competition from lower-cost providers. Competitor B is the next largest market share supplier to this market and has approximately a XX% market share, and competes with Competitor A on the basis of price, by offering a lower-quality product. ABC-XYZ (XYZ) has the smallest market share of the three companies, and has been very successful in applying it's lowest-cost, high-quality approach to the large commercial aviation market segment, resulting in growth from X% to XX% market share during 2003 to 2008. XYZ has accomplished this primarily by aligning itself with airlines that employ the complementary low-cost business model, and developing strong relationships with airline personnel, including: buyers, PMA-coordinators, engineers, and maintenance personnel. XYZ feels strongly that through a combination of new financial resources and new products, and application of its proven business approach, it can overtake Competitor B and become the number two supplier to the aviation appliance market. (Johnson, 2009)

To enable its continued growth, XYZ has identified the Regional Jet coffee maker market segment as an attractive market segment that could aid XYZ in its goal of becoming the number two supplier in aviation appliances. The Regional Jet market segment is dominated by two manufacturers – Bombardier and Embraer. XYZ has strong ties with several airlines that operate Embraer Regional Jets, and believes it can leverage these airline relationships to quickly enter the Embraer coffee maker market. Unfortunately, XYZ has only limited knowledge of this market, current products and the market potential, and needs more information to make an informed business decision of how to proceed with this product. This product feasibility plan will outline the recommended approach XYZ should use to effectively enter the Embraer coffee maker market for the ERJ-170/190 aircraft.

2. Strategic Objectives

The primary business objectives for the Embraer ERJ-170/190 coffee maker product are:

- Release the product to market in January 2010.
- Secure an initial 36% market share of the existing fleet in year one.
- Grow year-one market share by acquiring 24.8% of new deliveries for the next 8 years, while maintaining a net income greater than 25% of sales.
- Use this product platform to establish XYZ as the highest-value coffee maker supplier to the growing regional jet market, and fill an empty category in XYZ's current aviation appliance product offering.

3. Target Customers

Customers for this product will be airlines that own and operate Embraer ERJ-170/190 aircraft. The galley for this aircraft utilizes two coffee makers for brewing coffee for passenger beverage service. Customers have been classified into three categories, based on planned sales progression into the marketplace, and these customers categories are described below in detail.

3.1. Launch Customer

Airline X was contacted to conduct research in support of this plan, and upon learning that XYZ is considering development of this product, agreed to assist XYZ during development. Airline X has tentatively agreed to provide product specifications, and aircraft access for fit-checks and in-flight evaluation (Smith, 2009).

Airline X – City, Country

Decision Maker – Senior Engineer Aircraft Systems

Buyer – Vendor Administration

Key Influencers – Mechanics, Crew

This relationship is fortunate, as it will allow XYZ needed aircraft access, and a customer to use as a source of testimonial when approaching other customers.

3.2. Primary Customers

Primary Customers for XYZ's coffee maker are airlines that operate Embraer ERJ-170/190 aircraft, and have current business relationships with XYZ. XYZ plans to leverage these relationships, to rapidly place products into use at the following airlines:

Airline W – City, Country

Decision Maker - PMA Administrator

Buyer – PMA Administrator

Key Influencers – Mechanics, Crew

Airline Z – City, Country

Decision Maker – Dir. Of Supply Chain Management

Buyer – Dir. Of Supply Chain Management

Key Influencers – Dir. Of Maintenance

Airline Y – City, Country

Decision Maker – Dir. Safety and Engrg

Buyer - Unknown

Key Influencers - V.P. of Aircraft Maintenance

The Primary Customers will likely adopt the XYZ product if pricing falls in line with the typical XYZ discount (Karl, 2009). Embraer ERJ-170/190 aircraft fleet ownership for the Launch and Primary Customers is shown here in Table 3.2:

Table 3.2 – Launch and Primary Customer Fleet Size

Embraer ERJ-170/190 Fleet Ownership for XYZ's Existing Airline Customers (as of 1 January 2009)				
Customer	**Variant**	**Ordered**	**Delivered**	**Backlog**
Airline W	170	15	15	-
	190	45	45	11
Airline Z	190	104	36	68
Airline Y	170	36	36	-
Airline X	170	28	28	-
	190	42	25	17
		Totals	185	96

Adapted from: "Embraer 170 and 190." February 5, 2009. Jane's all the World's Aircraft. Retrieved 2009-02-10.

See Appendix A for detailed list of entire the entire Embraer ERJ-170/190 fleet.

3.3. Secondary Customers

Secondary customers for this product are airlines that do not have existing business relationships with XYZ, but have substantial fleet sizes (15+ aircraft) of Embraer ERJ-170/190 aircraft that justifies the sales effort required to procure the business. Currently, little knowledge exists of these customers, but they are likely to respond to the same sales approach and buying process as the primary customers (Karl, 2009). The Embraer ERJ-170/190 aircraft fleet size for the secondary customers is shown here in Table 3.3:

Table 3.3 – Secondary Customer Fleet Size

Embraer ERJ-170/190 Fleet - Orders and Deliveries for XYZ's Existing Airline Customers (as of 1 January 2009)				
Customer	**Variant**	**Ordered**	**Delivered**	**Backlog**
Airline V	190	15	15	
Airline U	170	14	14	
	190	31	27	4
Airline T	170	102	99	3
Airline S	170	15	15	
Airline R	170	6	6	
	190	18	12	6
		Totals	188	13

Adapted from: "Embraer 170 and 190." February 5, 2009. Jane's all the World's Aircraft. Retrieved 2009-02-10.

Based on limited knowledge of these customers, it is recommended that secondary customers be targeted after business is secured with primary customers, as shown in Figure 10.1 in Section 10.

4. Target Users

Target users for the product are airline personnel of the primary and secondary customers who are involved in aircraft coffee maker maintenance, and those directly affected by the product during operation. These customers include the following:

- **Airline Mechanics** – The mechanics are tasked with installation and maintenance of the coffee makers on the active fleet. They are sensitive to products that are difficult to install and those that do not meet expected life (Proctor, 2009). They have high level of influence over the customer airlines, as they work closely with airline engineers. It is a key to success to engage the mechanics and explain the features and benefits of your product, and enlist their help in both making the sale to the primary customer. Mechanics are a valuable source for in-service evaluation feedback (Johnson, 2009).

- **Airline Flight Crew** – This group includes pilots and flight attendants, and they are primarily concerned with the product function being of high quality, as they have primary responsibility for passenger beverage service. They are strong influencers of customer airlines, as they have a direct feedback route that can block sales if a coffee maker product's performance is not adequate. They are highly active in airline appliance product selection, and keenly aware of the customer service effects of poor system performance. (Smith, 2009)

- **Airline Revenue Passengers** – This group includes all revenue passengers, and they are primarily concerned with beverage service quality during their travels. They have low knowledge of the appliance systems aboard aircraft, and are impatient when waiting for beverage service during flight. They have little direct influence as individuals, but as a group are the most important target user as their freedom to choose alternate airlines provides great financial influence over customer airline purchasing decisions. Thus, it is critical to avoid beverage service quality issues and the negative publicity associated with these situations (Karl, 2009).

5. Product Description & Positioning Statement

Table 5.1 – Product Description and Positioning Statement

Target Customer and Problem Statement	For airlines who are trying to reduce maintenance and operating costs to improve profitability,
Company & Type of Product	XYZ's Embraer ERJ-170/190 coffee maker is an FAA-PMA approved product
High Level Solution and Benefit	that provides yearly cost savings of $3910 to $8950 per airplane, while maintaining product quality and improving performance.
Differentiation from Competitors	Unlike the OEM Competitor C and FAA-PMA Competitor B competitive coffee makers, we differentiate our product by its drastically reduced price without sacrificing performance, quality or support. Our price is less than 50% of OEM prices and 25% less than competing FAA-PMA products, offering superior value to our customers.

5.1. Business Problem, Product Concept and History

Airlines face ever-increasing scrutiny of their customer service, due to the removal of many complimentary travel perks. As a result, the few perks that remain must be high quality. Airlines ability to attract customers depends on their ability to provide hot, fresh coffee during air travel (Smith, 2009). At the same time, airlines are combating high fuel prices and increased competition from low-cost airlines, forcing airlines to focus on reducing maintenance costs (Jenichen, 2009). As a result, airlines are now actively seeking alternate products with lower cost to replace the high-cost OEM coffee makers used in their fleets, creating a huge opportunity for low-cost, high-quality products. XYZ is uniquely situated to take advantage of this recent trend.

While searching for new appliance products to develop in 2008, XYZ identified the Embraer ERJ-170/190 airplane coffee maker as a strong candidate for development (Proctor, 2009). For the cost-sensitive regional jet market, the product is an ideal candidate for development following XYZ's low-cost, high-quality product business model. Alignment of this opportunity with a fleet that has 36% ownership by just four airlines that XYZ already has strong relationships with, offers XYZ an excellent opportunity to quickly gain substantial market share with its product. Additionally, XYZ was recently approached by long-time, evangelist customer Al Smith, Senior Engineer Aircraft Systems at Airline X, indicating his interest in having XYZ produce the product.

XYZ's review of the competitor's products for this application revealed several opportunities to take advantage of. XYZ's product concept is to have a lighter-weight, lower-cost, improved-life product with equivalent quality to the OEM coffee maker. The XYZ coffee maker, through use of polymer components and seamless construction, will reduce coffee maker weight by 1.5 lbs. With two coffee makers per aircraft, this will result in a weight savings of 3 lbs per aircraft. Optimization of filter pleat spacing and count should improve the coffee maker life by a significant amount over the competitive products. Finally, XYZ's lower manufacturing cost and overhead, will allow for premium materials, first class support and 100% testing of product to ensure product quality, while still offering the product to the marketplace at a substantial discount to the competitors products. This design approach will prevent a price-based war, as XYZ's product will offer additional benefits beyond price alone.

5.2. Key Messages & Benefits

The Key Benefit of this product is reducing Embraer ERJ-170/190 aircraft operating and maintenance costs, while maintaining quality of OEM product and offering 1st class support. Customers can truly have the best of both worlds though XYZ's unique combination of:

- **Lower Part Price.** Because of its 25% lower price than the nearest competitor, XYZ's coffee maker will save customers $2900 to $7940 per aircraft per year.
- **Lower Weight Decreases Operational Costs.** XYZ's weight decrease of 3 lbs/plane over competitors' products will decrease yearly fuel consumption by 508 gallons, saving operators an additional $1010 per aircraft per year in fuel expenses.
- **Industry Leading Quality.** XYZ leads the industry in product quality, as it is the only supplier that tests its coffee makers 100% to ensure they meet performance specifications, and has had zero in-service failures during the last decade. (Johnson, 2009)
- **Industry Leading Customer Service and Support.** XYZ is "big enough to matter, and still small enough to care", and this is exemplified in our first class customer service and support via a combination of 24/7distributor support and XYZ direct relationships. Our distributors maintain inventories worldwide, and have parts available in 24hrs or less 95% of the time, ensuring AOG and maintenance downtime is avoided. (Karl, 2009)

5.3. Features, Functions, & Benefits

Table 5.3 – Features, Functions & Benefits

Feature	Function	Benefit and Proof
Increased Coffee Holding Capacity	Improves coffee maker life, which allows aircraft operators to increase replacement interval of coffee makers.	Reduces overall maintenance cost for airlines, as allows airlines to defer maintenance by operating coffee makers 10% longer than competitors.
Lighter Weight	Decreases operating weight of aircraft, improving fuel efficiency.	Decrease of coffee maker weight by 3 lbs per airplane, reduces fuel consumption on a yearly basis by 508 gallons, saving operators $1010 per year.
100% Performance Tested	All coffee makers subjected to functional testing to ensure they meet performance specifications.	Ensures all products meet performance specifications for coffee makers, ensuring passengers have reliable coffee available during beverage service.
Superior Packaging	Protects product from physical damage during shipping and storage.	Ensures product integrity and meets functional performance specifications. Allows airlines and distributors to reduce inventory levels, decreasing their inventory cash requirements. A single damaged product that results in an AOG situation could cost the distributor in excess of $3,500 and cost an airline a day's lost revenue.
FAA-PMA Approved Part	Part is approved by FAA to meet or exceed OEM part fit, function, form and weight.	Eliminates need for airlines to have engineering staff to approve part function, allowing an overall staff reduction and cost savings.

6. Market Data, Competitive Products, and Analysis

6.1. Aviation Forecast 2009-2018

New commercial aircraft deliveries have held steady during the current global recession, and the Aerospace Industries Association (AIA) has predicted the overall industry to grow at a rate of 2% for 2009. This is largely due to the airlines moving forward with modernization

of their fleets, to lower operating costs by moving to more fuel efficient aircraft (Tunstall, 2009). There are now over 18,500 commercial jets in operation in 2008, at over 400 airlines worldwide (Jenichen, 2009). As shown in Table 6.1, new aircraft deliveries in the global commercial jet fleet are expected to be 13,080 aircraft during the next decade. Taking into account the 2816 aircraft that are projected to be retired during this period, the 2018 commercial jet fleet size is forecasted to be 28,764 aircraft, for a growth of 55.4% during the next decade (Jenichen, 2009).

Table 6.1 – Projected New Commercial Jet Aircraft Deliveries for 2009-2018

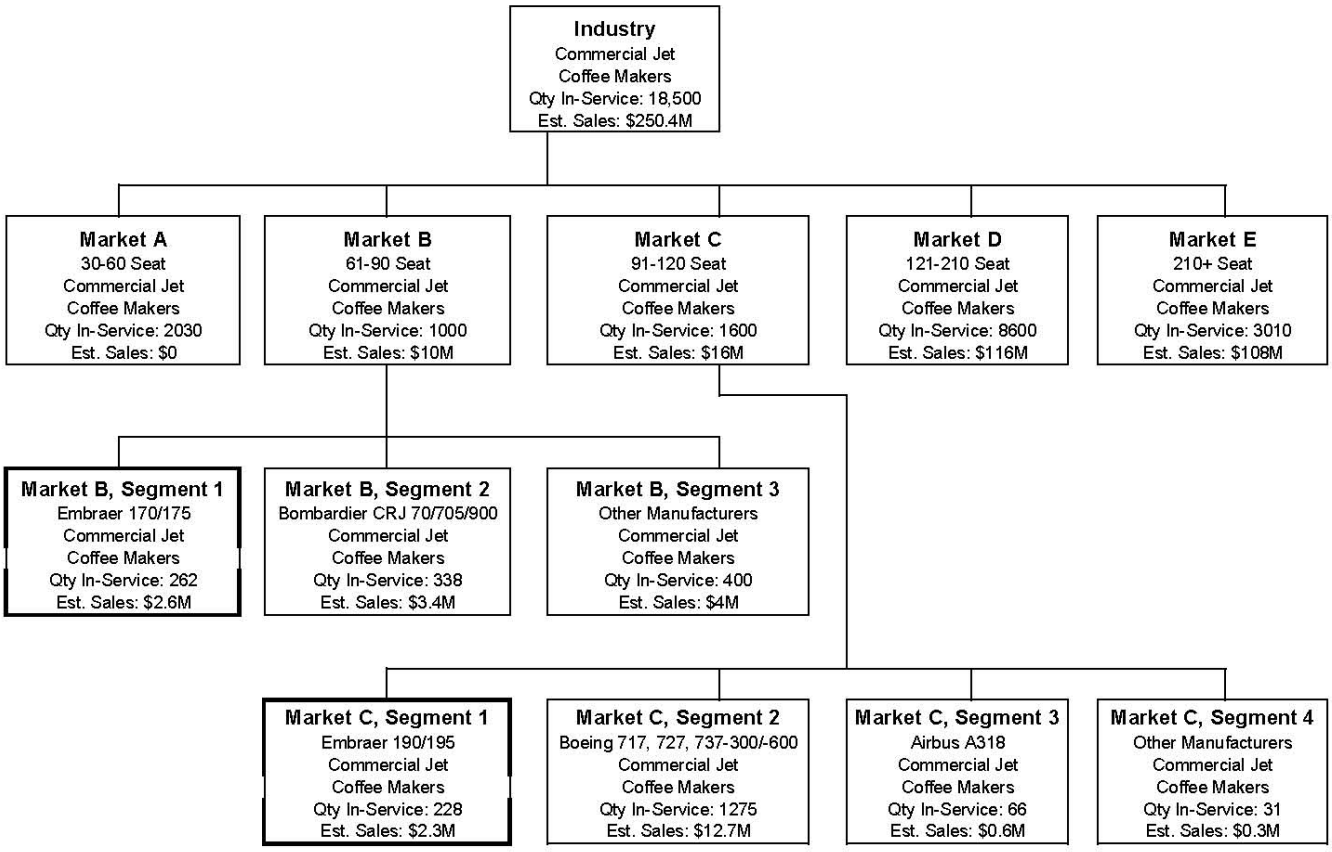
Seat Capacity	Qty Delivered	Percentage of Deliveries
30-60	75	0.6 %
61-90	1150	8.8 %
91-120	1,725	13.2 %
121-210	7,100	54.3 %
210+	3,030	23.1 %
Totals	13080	100 %

As can be seen in Table 6.1, demand for 61-120 seat aircraft is projected to remain strong during the next decade, and this growth will occur primarily in North America and Asia (Jenichen, 2009).

6.2. Market Hierarchy for Aviation Coffee Makers

As seen in Figure 6.2, the value of the Commercial Jet Coffee Maker Industry is estimated at $250.4M, and is comprised of the 18,500 commercial jets currently in operation at over 240 airlines worldwide (Jenichen, 2009). The Commercial Jet Coffee Maker Industry can be logically divided into five Markets based on aircraft seat capacity.

Figure 6.2 - Market Hierarchy for Commercial Jet Coffee Maker Industry



Adapted from: Jenichen, Erik. “Embraer Market Outlook 2009-2029.” Embraer. January 2009.

Market A, representing 30-60 seat aircraft, is the smallest market, and does not constitute any sales potential, as the aircraft do not currently utilize Coffee makers (Dillingham, 2004). Additionally, due to economies of scale, aircraft of this size are suited only for short regional flights and a rapid fleet buildup of 30-60 seat aircraft during the last 15 years has saturated the market with excess capacity. It is forecasted that only 75 aircraft in the 30-60 seat category will be delivered in the next decade, and most of these to replace existing fleet (Jenichen, 2009).

Market B, representing 61-90 seat aircraft, is a growing market for Coffee makers with a current size of $10M, and an operating fleet of 1000 aircraft. Market B can be further broken down into three segments based on aircraft manufacturer. Segment 1, representing

the Embraer ERJ-170 aircraft, is a $2.6M segment with 262 aircraft currently in operation. Segment 2, representing the Bombardier CRJ 70/705/900 aircraft, is a $3.4M segment with 338 aircraft in operation. Segment 3, representing the five other manufacturers that have ceased production, is a $4M segment with 400 aircraft currently in-service. Market B has been forecasted for 1150 new aircraft deliveries in 2009-2018. Additionally, it is expected that the Embraer ERJ-170 will make up 40.1% of these new deliveries, adding 461 additional aircraft to the current 262 planes for a total fleet of 723 aircraft in 2018. (Jenichen, 2009)

Market C, representing 91-120 seat aircraft, is also a growing market for coffee makers with a current size of $16M, and an operating fleet of 1600 aircraft. Market C can be further broken down into four segments based on aircraft manufacturer. Segment 1, representing the Embraer ERJ-190, is a $2.3M segment with 228 aircraft currently in operation. Segment 2, representing the Boeing 717/727/737-300/737-600, is a $12.8M segment, with 1275 aircraft in operation. Segment 3, representing the Airbus A318, is a $0.6M segment with 66 aircraft in operation. Segment 4, representing various other manufacturers, is a $0.3M segment with 31 aircraft in operation. Market C has been forecasted for 1725 new aircraft deliveries in 2009-2018. Additionally, it is expected that the Embraer ERJ-190 will make up 40.1% of these new deliveries, adding 691 additional aircraft to the current 228 aircraft for a total fleet of 919 planes in 2018. (Jenichen, 2009)

Markets D & E, representing 121-210 and 210+ seat aircraft, comprise the last two markets. They are the largest two markets for Coffee makers and have current sizes of $116M and $108M, respectively, and have a combined fleet size of over 11,610 aircraft in operation (Jenichen, 2009). XYZ currently is the third largest supplier to these markets, with a combined market share of X% with sales of $12M (Johnson, 2009). XYZ has grown sales in these markets by an annual rate of 29.5% since 2005, due to its strategy of being the low-cost provider, and the increasing focus by airlines to reduce operating costs.

6.3. Embraer Overview

“Embraer is the world’s largest manufacturer of jets with less than 120 seats. Embraer's headquarters are located in São José dos Campos, São Paulo, and it has offices, industrial operations and customer service facilities in Brazil, the United States, France, Portugal,

China and Singapore. Founded in 1969, the Company designs, develops, manufactures and sells aircraft for the Commercial Aviation, Executive Aviation, and Defense and Government segments. The Company also provides after sales support and services to customers worldwide. On December 31, 2008, Embraer had a workforce of 23,509 employees and a firm order backlog of US$ 20.9 billion." (Embraer, Jan 12, 2009)

6.4. Embraer ERJ-170/190 Coffee maker Market Expectations & Trends

Cost challenges for airlines increasing.

Airlines are under enormous pressure to find ways to reduce operating cost, to combat all-time high fuel prices and air travel demand decreases stemming from the recent economic recession. Airline net losses exceeded $8.5B during 2008, and are forecasted to be $4.7B in 2009, creating a new urgency to look at all methods possible to reduce and defer costs. Products with lower purchase prices, extended life and that decrease fuel usage have an increased competitive advantage in purchasing decisions. The following data supports this conclusion:

> "The International Air Transport Association (IATA) announced a revised outlook for the global air transport industry with losses of US$4.7 billion in 2009. IATA also revised its forecast losses for 2008 from US$5.0 billion to US$8.5 billion." (Source: "Grim Prospects – Deep Recession, Bigger Losses." IATA press release No. 10, March 2009)

Low-cost airline model is rapidly growing.

Cost pressures and increased passenger acceptance of the low-cost airline model, has resulted in the low-cost airline fleet doubling in size since 2000. The low-cost airline model aligns naturally with the low-cost, high-quality products approach. The following data supports this conclusion:

> "The low-cost carrier global fleet has doubled since 2000, while traditional network carrier fleets increased only 10%." (Source: "Embraer Market Outlook 2009-2029." Feb. 2009)

Regional jet fleet will double in size over the next decade.

The regional jet fleet is projected to double in size over the next decade, and this market segment is dominated by two manufacturers – Bombardier and Embraer. Embraer is forecasted to be the market leader in this segment, capturing 40.1% of the new deliveries,

and combining this growth with low competition for the coffee maker business, makes this market segment an attractive growth market. The following data supports this conclusion

> "Bombardier and Embraer are presently the two dominant players in the regional aircraft market. Of these two, Embraer is currently the better positioned to take advantage of the long-term trend toward larger aircraft. The Forecast International study projects that, during the next 10 years, Embraer will produce 1,357 regional jets, a market share of 40.1 percent." (Source: "Demand Shifting Upward in Regional Jet Market." Forecast International Press Release, Sept. 2005)

FAA-PMA acceptance is increasing.

FAA-PMA part acceptance is increasing rapidly, due to airlines desire to cut maintenance costs and the proliferation of the low-cost airline model. The FAA-PMA parts approval process is stringent, and combined with the solid safety record of FAA-PMA parts, has enabled bi-lateral agreements with foreign aviation authorities, opening up Asia and Europe for FAA-PMA sales. FAA-PMA part cost advantage and widespread acceptance provides an attractive alternative for cost-conscious airlines. The following data supports this conclusion:

> "PMA parts acceptance [among airlines] was pretty low just five years ago," says Hal Chrisman, a principal at the Ann Arbor, Mich.-based management consulting firm, AeroStrategy. North American airlines have long used PMA parts, but their interest in their cost-cutting value has increased noticeably since 9/11 and the resulting economic downturn. PMA parts "provide the irresistible cost advantage of 30 percent to 50 percent," says Kirti Timmanagoudar, research analysis at the consulting & analysis company, Frost & Sullivan, San Jose, California. (Source: "Plotting the Potential for PMA Parts." Aviation Maintenance, 2006)

6.5. Competitive Products Overview

Our current competitors for the Embraer ERJ-170/190 aircraft coffee maker market segment are Competitor C and Competitor B. The following two paragraphs review their position in the Embraer ERJ-170/190 coffee maker market segment, and provide an overview of their products.

Competitor C is the sole OEM supplier to this market. Competitor C was awarded the contract to supply the appliance program for the Embraer ERJ-170/190 in 1999. Competitor C does not manufacture coffee makers, so instead has subcontracted the coffee maker manufacture and design to Competitor A. Competitor A has an exclusive agreement to supply this coffee maker to Competitor C for the life of the Embraer ERJ-170/190

production, and is sold to airlines directly via Embraer. (Wilson, 2009) This coffee maker is the market leader, has excellent performance and quality, and is the highest priced offering. In 2006, Competitor C opted to get this coffee maker FAA-PMA approved to enable aftermarket sales and distribution via distributor CCC. The Competitor C coffee maker will be the closest competing product on a function and quality basis.

Competitor B began selling their coffee maker in this market in 2008, after receiving FAA-PMA approval. The Competitor B coffee maker uses lesser quality materials wherever possible, including expanded metal vs. laser cut screens, and as a result has a less expensive product. FAA-PMA parts usually offer little opportunity for innovation, due to the need to meet OEM specifications and the great burden to convince the FAA to approve products that are significantly different than OEM designs, so manufacturers often decide to compete solely on price. The Competitor B coffee maker has no functional advantages, and is a “me-too” product when compared to the Competitor C coffee maker. Competitor B provides this product to the airlines via aftermarket parts distributors DDD and EEE. The Competitor B coffee maker will be the closest competing product on price.

6.6. Competitor Strengths, Weaknesses & Response Statements

A strategic review of the competitive products combined with a strategic review of sales and distribution practices of each competitor was completed. Based on the strategic reviews, the following competitor strengths, weaknesses and XYZ’s response statement was determined, and are shown in detail in Tables 6.6a & 6.6b shown here:

Table 6.6a – Competitor C Competitive Strengths, Weaknesses and Response Statement

Competitor 1 – Competitor C (Manufactured by Competitor A)	
Strength #1	OEM supplier with excellent reputation
Strength #2	High quality, high performing product
Weakness #1	Premium price - Limited in ability to discount price, as decreasing price to compete with FAA-PMA products informs customers that they are being greatly overcharged.
Weakness #2	Competitor C does not manufacture coffee maker – Adds additional level of mark-up to the product and prevents them from offering airlines multiple product purchase discounts.
Response Statement	The XYZ product will provide you the same quality and performance as the OEM coffee maker, at half the price.

Table 6.6b – Competitor B Competitive Strengths, Weaknesses and Response Statement

Competitor 2 – Competitor B	
Strength #1	Lower price than OEM and strong aftermarket distributors
Strength #2	OEM supplier for other coffee makers with decent reputation
Weakness #1	Performance lower than OEM
Weakness #2	Lesser quality materials and packaging than OEM
Response Statement	The XYZ product will provide you with higher quality and performance, at a substantial 25% discount.

XYZ should be able to exploit Competitor C's high price, and Competitor B's cheaper construction and mid-point price to achieve a competitive advantage for this product.

7. Financial Data/Business Model

7.1. Pricing

Current Market prices of existing Embraer ERJ-170/190 coffee maker products and potential XYZ product is shown in Table 7.1 below:

Table 7.1 – Pricing for Embraer ERJ-170/190 Coffee makers

Manufacturer	Seller	Distributor	Distribution Channel	Retail Price	Discount From OEM	Discount From Nearest Competitor
Competitor A	Competitor C	Embraer	OEM Sales	$11000 Est.*	N/A	N/A
Competitor A	Competitor C	CCC	Aftermarket Sales	$8320	25%	25%
Competitor B	Competitor B	DDD EEE	Aftermarket Sales	$5800	47.3%	30.3%
XYZ	XYZ	AAA BBB	Aftermarket Sales	$4350	60.5%	25%

* OEM Sales price based on typical Competitor A 25% aftermarket discount for aviation appliances

XYZ has determined from previous FAA-PMA products that discounting retail prices 25% lower than the lowest competing aftermarket product allows airlines to justify the administrative cost of switching to XYZ (Karl, 2009), while still allowing for cost savings to be realized in the first year. Following this pricing strategy, the XYZ coffee maker for the

Embraer ERJ-170/190 aircraft would have a retail price of $4350. The XYZ coffee maker will be priced at a discount of 60.5% from the OEM price, making the XYZ product extremely attractive for airlines seeking cost savings.

7.2. Financial Projections

The project financial projections are based on a forecast that includes securing business from all four primary customers in year one, and then growing sales in subsequent years by securing 24.8% of new aircraft deliveries. Additionally, COGS is estimated at $680/coffee maker and S,G & A expenses are estimated conservatively as 30% of sales, as historically they are 22-25% for similar products at XYZ (Bone, 2009). Based on this information, and the product being introduced to market on January 1, 2010, the following Pro Forma Income Statement for the project was developed:

Table 7.2 – Pro Forma Income Statement

Embraer ERJ-170/190 Aircraft Coffee Maker - Pro Forma Income Statement								
Year	2010	2011	2012	2013	2014	2015	2016	2017
Unit Price	$4350	$4220	$4090	$3970	$3850	$3740	$3620	$3510
Unit Sales	370	427	484	541	598	655	712	769
Revenues	$1609500	$1801730	$1980970	$2147840	$2302910	$2446750	$2579880	$2702820
Variable Costs	$251600	$290360	$329120	$367880	$406640	$445400	$484160	$522920
Fixed Costs	$482850	$540520	$594290	$644350	$690870	$734020	$773960	$810850
Depreciation	$15783	$27049	$19317	$13795	$9863	$9863	$9863	$4915
EBIT	$859270	$943810	$1038250	$1121820	$1195540	$1257460	$1311900	$1364140
Taxes (34%)	$292150	$320890	$353000	$381420	$406480	$427540	$446040	$463810
Net Income	$567120	$622910	$685240	$740400	$789060	$829930	$865850	$900330

* See full detailed Financial Analysis in Appendix B

The project returns are very solid, and with a development cost of $516,830 and capital equipment requirements of just $110,450, the project Payback is achieved by October 2010, using a conservative discount rate of 20%. Additionally, using the conservative 20% discount rate, the project's Net Present Value (NPV) is $2,352,350 with an Internal Rate of Return (IRR) of 129%.

8. Sales & Distribution

8.1. Established Distribution Method

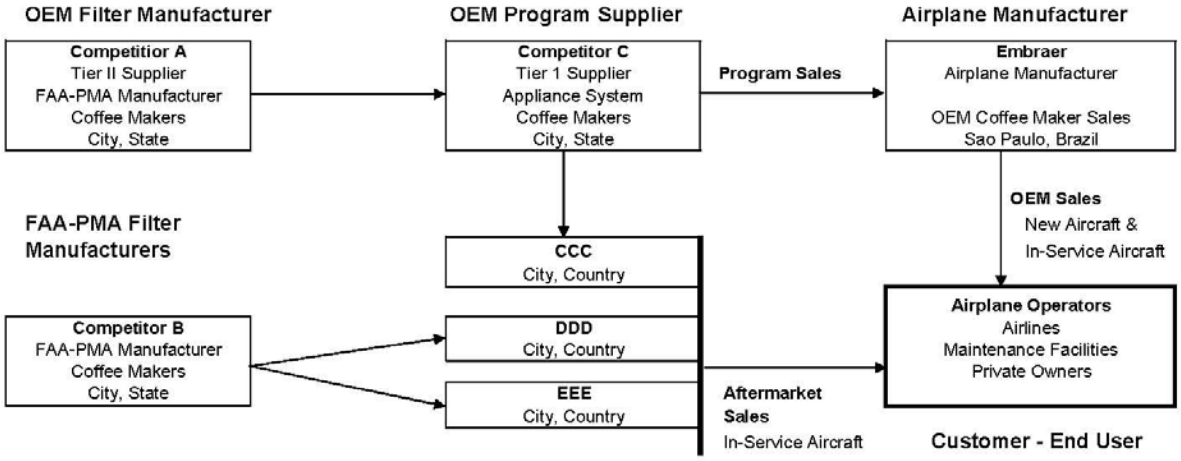
Embraer ERJ-170/190 coffee makers are sold to the airplane operators by via two distinct sales channels – OEM Sales and Aftermarket Sales.

OEM Sales consist of coffee makers installed on new airplane deliveries, and sales directly from Embraer to support coffee makers replaced during required maintenance of in-service aircraft. OEM Sales offer the customer the lowest-effort purchasing choice, as the parts are high-quality OEM parts, and have guaranteed availability, but are also the highest cost (Karl, 2009). Airlines assume no risk to purchase parts using this sales channel, as parts are FAA approved during the aircraft certification process.

Aftermarket Sales consist of coffee maker manufacturers selling product to the end users via aviation appliance distributors. Companies in this category include both OEM suppliers as well as FAA-PMA manufacturers. FAA-PMA manufacturers do not bear the burden of large OEM Program development costs, so they have much lower cost structures and can therefore sell apples-to-apples products at lower prices. Additionally, many OEM suppliers acquire FAA-PMA certification for their coffee makers, to make them available at lower prices to compete with the FAA-PMA products and allow for sales via the appliance distributors. Airlines benefit from buying parts via the Aftermarket Sales channel, as parts are available at reduced cost, and offers the ability to negotiate prices and long-term contracts. Additionally, many aviation appliance distributors offer on-hand inventory and warehousing allowing airlines to free up cash flow reserved for stocking replacement parts.

The current competitors and distribution model for Embraer ERJ-170/190 coffee makers are shown in the figure 8.1 below:

Figure 8.1 – Embraer Coffee maker - Current Distribution



In the current model, Embraer sells product to aircraft operators directly via the OEM Sales channel. The coffee makers they sell are supplied by Competitor C according to an exclusive contractual agreement for the Appliance System Program, and manufactured by Competitor A. The contract precludes Competitor A from selling product directly to aircraft operators through the Aftermarket Sales channel, and instead must route Aftermarket Sales through Competitor C (Wilson, 2009). This is significant, as it adds an additional step in the distribution chain, increasing distributor retail price for aftermarket sales for the Competitor A manufactured coffee maker. The Competitor A manufactured coffee maker is sold globally in the aftermarket by distributor CCC (Ball, 2009).

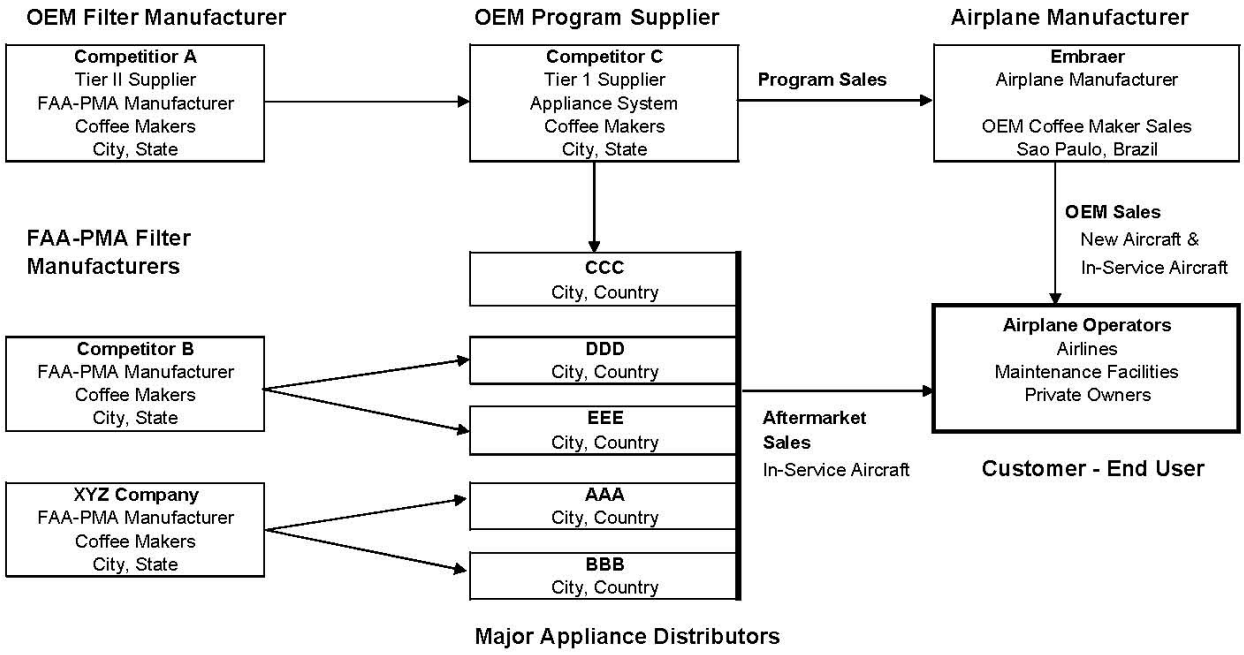
Competitor B is currently the only FAA-PMA manufacturer in this market segment, and sells its products to aircraft operators via the Aftermarket Sales channel only. As is typical with OEM vs. aftermarket sales, they compete primarily on price. Competitor B uses aftermarket distributors DDD to sell product in the America's, and EEE to sell product in Europe, Asia and Africa (Karl, 2009).

8.2. Distribution after XYZ Market Entry

XYZ's sales for its FAA-PMA coffee maker will follow a distribution plan similar to Competitor B. It will reach aircraft operators via the Aftermarket Sales channel only. XYZ will utilize its two current distributors for the coffee maker product line – AAA and BBB. AAA and BBB both have a worldwide presence and will be allowed to pursue business with

airlines in competition with each other, but they must adhere to established pricing guidelines (Karl, 2009). Utilizing existing distributors will allow for leverage of current sales relationships with the airlines, and allow them to further strengthen relationships by providing airlines with one-stop shopping for their coffee makers. When XYZ enters the market in 2010, the distribution for the Embraer ERJ-170/190 coffee maker market segment will be as shown in Figure 8.2 below:

Figure 8.2 – Embraer Coffee maker - Distribution after XYZ Market Entry



8.3. Sales Strategy

Airlines will buy the product from XYZ's distributors AAA and BBB, and XYZ will guide and support sales activity via its internal sales staff. The Ascend commercial database will be utilized to identify fleet ownership and to monitor fleet operational hours, and this information will be used to target airlines that XYZ has current relationships with and those with substantial fleets. Customers will be targeted, using a sales progression strategy that builds on early successes. After launching the product with Airline X in late 2009, sales will first focus on airlines with existing relationships, and then extend to new customers in 2011-2013.

A prototype of the product will be showcased by AAA at the 2009 Paris Air show, and actual product will be displayed by AAA at the 2010 Singapore Air show and London Air show to develop market awareness of the product. Leads for new customers will be generated via attendance in aviation purchasing and maintenance conferences including the ACPC and CCMA shows. Product training will be conducted with all sales personnel at AAA and BBB, as well as conducting co-visits to airlines for new sales, continuing the relationship based selling approach XYZ has successfully utilized in the large commercial aviation appliance market segment. Traditional collateral material will be available, including a product catalog, marketing brochures, data pack, and inclusion online at www.XYZ.com. (Karl, 2009)

9. Product Specifications

Product specifications for the product are based on information gleaned from conversations with airline and aviation industry contacts, FAA-PMA supplements, distributor contacts and Embraer documents including IPC's. The product specification for the product is shown here in Table 9.1:

Table 9.1 – Product Specification

Product Specification - Embraer ERJ-170/190 Coffee Maker	
Product Description	This coffee maker is a passive Class III part, used to brew coffee for in-flight beverage service
Replacement Eligibility (Competitive P/N's)	XXX-XXX Competitor D (Discontinued) XXXXX-XX Competitor C (Mfg. by Competitor A) XXXXXXX Competitor B
Installation Eligibility	Embraer Empresa Models: ERJ170-100STD, -100 LR, -100SU, -100SE ERJ170-200STD, -200LR, -200SU ERJ190-100IGW, -100LR, -100STD, -100ECJ
Usage	2 Coffee makers per Aircraft
Performance Specifications	Cups per Hour = 120 cups Energy Usage = 1500 Watts
ATA Chapter	Chapter XX – Galley Systems
IPC Locations	Galley Coffee Makers [XX-24-02]
FAA Regulatory Requirements	Meet the requirements of CFR 14 Paragraph 25.1301. Weight, Dimensions and Fit shall be equivalent to OEM Part

It is suggested that the product specification be revised to include information determined after competitive product review and testing during product development.

10. Go to Market Plan

XYZ has identified three main marketing objectives that will be crucial to gain early wins and ensure success with the Embraer ERJ-170/190 aircraft coffee maker. First, airlines are hesitant to adopt new products, so XYZ will enlist the help of Airline X to be the launch customer, which will open the market for other sales. XYZ also needs to demonstrate clearly the product's cost advantages, and will accomplish this by sharing success stories from the launch customer, and individualizing the sales process for each airline. Finally, XYZ needs to erase all doubt about the product quality, and will accomplish this by leveraging XYZ's participation in standards organizations that are leading the way for aviation air quality, XYZ's zero-failure product history, and our strong relationships with industry leading distributors.

XYZ plans to target Airline X as the launch customer, as they have expressed interest and have strong existing business relationships with XYZ. The product development team will involve Airline X early in the product development process, by interviewing them to determine product expectations in the field, creating a partnership environment that will aid in making the project a success. The relationship will be leveraged to provide aircraft access for fit-check during the FAA-PMA approval process, in-flight evaluation, and provide a low-risk opportunity to test the pricing and sales approach. It is expected that working with Airline X to fine-tune the sales approach will allow for XYZ to gain their business and secure a testimonial of the XYZ coffee maker's benefits to use for securing business at other targeted airlines.

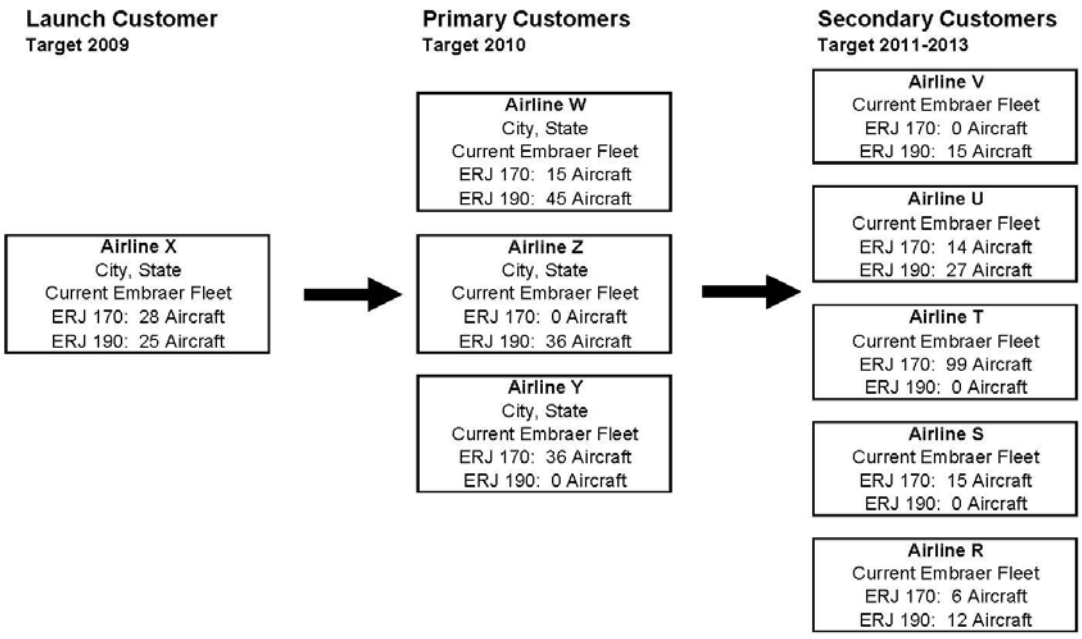
Clearly demonstrating the product's cost advantages to potential customers will be crucial to interesting airlines to switch to XYZ's product (Karl, 2009). XYZ plans to develop a financial model that can be used to create an airline specific cost savings analysis, to individualize the sales process and demonstrate the financial benefits of doing business the XYZ way.

XYZ will reinforce this message by sharing cost-savings results other airlines have had with the product, and providing testimonials from current users that back up the claims.

The third critical objective of the go to market plan is to reinforce that XYZ produces only the highest quality products. It is important to erase all doubt in potential customers that the lower-priced XYZ product is not cheaper due to lower quality components or performance (Johnson, 2009). The XYZ sales force will be armed with Data Packs for the product that illustrate product performance equivalence, and the robust AS9100b quality system and 100% product testing protocol in place at XYZ. Finally, to ensure credibility, XYZ will co-display at major aviation tradeshows with well-respected, leading parts distributors.

It is recommended that during the initial period of 2009 to 2013, customers be targeted according to the timeframes shown here in Figure 10.1:

Figure 10.1 – Proposed Sales Effort Progression



Following the sales effort progression as shown in Figure 10.1, should allow for an optimization of sales effort to maximize sales effort return. This approach allows for time to research and begin relationship building with Secondary Customers, as well as provide for

early wins with Primary Customers where relationships already exist. It is recommended that XYZ's sales force align each customer opportunity with the distributor that has the best current customer relationship and most product placements.

11. Development Plan Overview

11.1. Development Effort & Resources

The project will require the following human resource effort levels during the eight month development period of May through December 2009:

Engineer/Project Manager – 17 man-weeks effort
Designer – 7 man-weeks effort

As is normal for product development, work will go through periods of high and low intensity, and personnel assigned to this project will be able to contribute to multiple projects during the 8 month project period. Additionally, staff from other functional areas will be asked to contribute periodically, but workload will be limited and able to be absorbed into their normal schedules. Sales, Marketing, Quality and Operations contributions are defined specifically elsewhere in this plan.

Engineering staff will require use of XYZ's existing Pro/Engineer and FloWorks software for design development, internal test facilities, engineering workshop, production equipment and tools. Engineering will utilize external rapid prototyping resources at ABC in City, State, and external test lab XXX Technologies in City, State, for prototype components and testing services, respectively.

11.2. Development Strategy

The project will be conducted according to requirements in XYZ's AS9100b Quality Assurance Manual. Flow charts detailing these process requirements can be reviewed in detail in Appendix G. Highlights of the development strategy are as follows:

- OEM and FAA-PMA competitive coffee makers will be procured, tested, and disassembled, to develop the product specification and used to aid reverse engineering the product.
- XYZ Engineering to design coffee maker using Pro/Engineer CAD software, and performance estimated using FloWorks CFD design software.
- XYZ engineering will focus design innovation around reducing the product weight and cost, through the use of alternate materials, and improved designs.
- Design Reviews conducted as Stage-Gates to ensure multi-disciplinary feedback on product and communication of design.
- Airline X will be utilized to provide fit-check access, in-flight performance evaluation, design review feedback and as a source to provide Embraer and OEM coffee maker manufacturer documentation to support FAA-PMA approval process.
- Alpha and Beta Prototypes will be developed using housings produced via rapid prototyping, to minimize the project schedule and prevent expensive tooling revisions resulting from part changes.
- Once part geometry and specifications are finalized, tooling and capital equipment will be procured, so that production parts will be available at the start of the FAA-PMA approval process.
- Custom packaging will be developed and tested to assure products survive the repeated shipping that occurs in the distribution chain.

11.3. Quality Assurance Resources

In support of the product development, an experienced quality inspector will be required for two weeks during the development period to conduct 1st article inspections of components and final inspection of finished goods. It is expected that existing measuring tools and equipment will be satisfactory for completing this project. A product quality plan and quality documents to support manufacturing and FAA-PMA approval of the product will be the responsibility of engineering.

11.4. FAA Resources & Approval

FAA-PMA approval will require an estimated one week of effort each of by XYZ's internal FAA Designees, to prepare necessary approval documentation and witness conformity testing. Additionally, external FAA resources at the XXX ACO, and XXX MIDO, will be required during the approval process. It will be very important to ensure all documents sent to the FAA are correct because revisions can prove very costly to the project schedule due to the 30-day review period (Proctor, 2009).

12. Operations Plan Overview

12.1. Manufacturing Plan

The manufacturing plan responsibility for this product will be assigned to XYZ's Operations Manager. Manufacturing plan will include personnel training plan, production planning, procurement of necessary tools and equipment, and staff planning. It is expected that current staff and resources can be utilized to complete this project, with limited capital expenditures for tooling of $110, 450 as shown in detail in Appendix B.

12.2. Procurement Plan

XYZ's purchasing department will hold responsibility for procurement of both prototype and production components and capital equipment. Project Manager must approve of all project expenditures, and provide sources for new components. All prototype parts will be purchased and received using the FAA-proto process as defined in XYZ Procedure K4 - XYZ Purchasing Policy. It is expected that staff requirements for procurement will be very limited, and will not require additional effort.

12.3. Sales Operations

Sales and customer service will hold responsibility for taking and processing orders, negotiating prices with distributors, warranty claims, and distributor sales support.

Engineering will provide technical support to sales to develop collateral materials and sales data packs, as well as resolution of customer technical issues. It is not expected that additional sales resources will be required to support this product.

13. Product Schedule: Major Milestones

The product development schedule for this project includes a development period lasting eight months, starting in May 2009 and concluding with FAA-PMA approval in December 2009. Major milestones for the project are as follows:

Table 13.1– Project Schedule: Major Milestones

Milestone	**Expected Completion**
Project Approval - Funding	5/1/09
Marketing Plan Complete	6/1/09
Sales Plan Complete	6/1/09
Development Plan Complete	6/1/09
Quality Assurance Plan Complete	6/1/09
Manufacturing & Procurement Plan Complete	6/1/09
Finalize Product Specification	6/15/09
Product Review & Release for Development	6/15/09
Alpha Prototype	7/25/09
Design Review - Alpha Prototype	8/1/09
Beta Prototype	8/25/09
Design Review - Beta Prototype	9/1/09
Freeze Design - Finalize Product Documentation	9/20/09
Begin FAA Approval Process	10/1/09
FAA-PMA Approval	12/1/09
Announce Product to Market	12/1/09
Pilot Production Run	12/15/09
Release Product to Market	1/1/10

The schedule shown is based roughly on the average time-to-market of six similar projects completed by XYZ during the last two years. Project completion times for these six projects ranged from 5.8 to 11.8 months, with a median of 7.9 months. The data shown in Appendix E indicates a 67% and 83% probability of completion within 8.3, and 10.5 months, respectively.

14. Product Team: Roles and Responsibilities

Table 14.1 – Product Team: Roles & Responsibilities

Role Responsibility	**Department/Function**	**Assigned Lead**	**Additional Team Members**
Product Development, Product Testing, Prototyping, Manage FAA Product Approval Process	Engineering	Product Engineer	Staff Engineer, Designer
Manufacturing Plan, Train Operators, Customer Service, Production	Operations - Production	Operations Manager	Line Manager, Lead Operator, Operators
Marketing Plan Development & Implementation	Marketing	Marketing Manager	Marketing Staff
Sales Plan, Sales, Distributor Training & Management	Sales	Sales Director	Sales Staff
QA Plan, Inspection Plans, First Article	QA	QA Manager	QA Inspector
Secure Funding for Project, Financial Reporting, Accounting	Finance	Finance Director	Accountant
Document, Drawing & Design Approval, Witness Testing	FAA DER	XYZ's DER	N/A
Conformity Unit Approval, Witness Testing	FAA DMIR	XYZ's DMIR	N/A
Design Approval	FAA ACO Project Engineer	ACO Program Manager	ACO Engineer
Manufacturing-Inspection System Approval	FAA MIDO Safety Inspector	MIDO Engineer	MIDO Safety Inspector

15. Conclusions & Recommendations

This product feasibility plan concludes that:

1. There is a sizeable market for the product, and customer alignment exists with XYZ's high-value sales philosophy.
2. The product is extremely attractive financially – high NPV, rapid payback and not sensitive to discount rate.
3. XYZ can leverage its existing airline relationships to secure rapid product placement.

4. XYZ can offer a superior product, preventing price-only competition and the high-margin allows for profitability to be maintained if price does erode.
5. The product requires minimal capital equipment investment, decreasing investment risk, and improves utilization of existing assets.

Based on the conclusions reached during development of this feasibility plan, it is recommended that XYZ:

1. Fund this project and begin Development in May 2009.
2. Conduct full-blown marketing study to validate market potential, and improve market knowledge.
3. Develop detailed project schedule, identifying critical path and resource requirements to ensure launch deadline of January 1, 2010 is met.

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Appendices

Appendix A – Embraer ERJ-170/190 Fleet

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Appendix B – Development Cost Estimate

Embraer ERJ-170/190 Cabin Air Coffee Maker Development Cost Estimate	
Description	**Cost**
OEM Samples	$39,000
OEM Sample Testing	$24,000
Rapid Protos - End caps	$12,000
FAA Proto Components	$80,000
FAA Proto - Testing	$24,000
Travel	$20,000
Misc.	$10,000
Packaging Development	$3000
FAA Testing	$12,000
FAA Travel	$75,000
Eng. Personnel (1/3 year salary)	$193,330
Eng. Drafter(1/8 year salary)	$62,500
Tooling/Fixtures	$12,000
Equipment	$10,000
Shipping/Freight	$7,500
Total Cost	**$516,830**

Appendix C – Financial Analysis

COGS Estimate Worksheet

Bill Of Materials				
Material	**Description**	**Qty**	**Unit Price**	**Extended Price**
Aluminum	Component X	10	$6.00	$60.00
ABS	Component X	10	$4.00	$40.00
Aluminum	Component X	10	$3.00	$30.00
Aluminum	Component X	10	$3.00	$30.00
Glass Fiber	Component X	10	$28.00	$280.00
Silicone Foam Rubber	Component X	10	$1.75	$17.50
FR Urethane	2-Part Potting Material (lbs)	10	$4.20	$42.00
EVA Copolymer	Hot Melt Stick	0.5	$4.25	$2.10
ABS	Component X	30	$0.95	$28.50
Corrugated Fiberboard	Individual Carton	10	$1.75	$17.50
Mylar	Labels	10	$0.10	$1.00
NA	XYZ Labor (hrs)	3.3	$40.00	$132.00
			Cost of Goods Sold (COGS)	**$680.60**

Capital Equipment Requirements

Tooling and Capital Equipment				
Part Number	**Description**	**Qty**	**Price**	**Vendor**
TBD	Injection Mold	1	$90,000.00	Vendor A
TBD	Upper End cap - Metal Spinning Die	1	$4500.00	Vendor B
TBD	Assembly Fixtures	1	$10,000.00	Misc.
TBD	Tooling/Die for Master Carton	1	$5950.00	Vendor C
	Total Tooling Cost		**$110,450.00**	

Unit Sales & Revenue Projection

Year	Unit Price[1]	Unit Sales[2]	Revenue
2010	$4350	370	$1609500
2011	$4220	427	$1801900
2012	$4090	484	$1981300
2013	$3970	541	$2148320
2014	$3850	598	$2303530
2015	$3740	655	$2447500
2016	$3620	712	$2580750
2017	$3510	769	$2703810

1. Assumes 3% price erosion per year after 2010.
2. Assumes securing business with all Primary Customers in 2010, and 24.8% of new deliveries thereafter.

Depreciation

Year	MACRS Percentage	Depreciation	Ending Book Value
2010	14.29%	$15,783	$94,666
2011	24.49%	$27,049	$67,617
2012	17.49%	$19,317	$48,299
2013	12.49%	$13,795	$34,504
2014	8.93%	$9863	$24,641
2015	8.93%	$9863	$14,778
2016	8.93%	$9863	$4915
2017	4.45%	$4915	$0.00
Totals	**100.00%**	**$110,450**	

Pro Forma Income Statement

Embraer ERJ-170/190 Aircraft Coffee Maker - Pro Forma Income Statement								
Year	2010	2011	2012	2013	2014	2015	2016	2017
Unit Price	$4350	$4220	$4090	$3970	$3850	$3740	$3620	$3510
Unit Sales	370	427	484	541	598	655	712	769
Revenues	$1609500	$1801730	$1980970	$2147840	$2302910	$2446750	$2579880	$2702820
Variable Costs	$251600	$290360	$329120	$367880	$406640	$445400	$484160	$522920
Fixed Costs	$482850	$540520	$594290	$644350	$690870	$734020	$773960	$810850
Depreciation	$15783	$27049	$19317	$13795	$9863	$9863	$9863	$4915
EBIT	$859270	$943810	$1038250	$1121820	$1195540	$1257460	$1311900	$1364140
Taxes (34%)	$292150	$320890	$353000	$381420	$406480	$427540	$446040	$463810
Net Income	$567120	$622910	$685240	$740400	$789060	$829930	$865850	$900330

Changes in Net Working Capital

Year	Revenue	Net Working Capital	Cash Flow
2009		$516830	-$516830
2010	$160,950	$160950	$355880
2011	$180,190	$180190	-$19240
2012	$198,130	$198130	-$17940
2013	$214,832	$214830	-$16700
2014	$230,353	$230350	-$15520
2015	$244,750	$244750	-$14400
2016	$258,075	$258080	-$13330
2017	$270,381	$270380	-$12310
	*Assumes NWC is 10% of sales		

Projected Cashflows

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017
Operating Cashflow									
EBIT		$859,270	$943,810	$1,038,250	$1,121,820	$1,195,540	$1,257,460	$1,311,900	$1,364,140
Depreciation		$15,783	$27,049	$19,317	$13,795	$9,863	$9,863	$9,863	$4,915
Taxes		($292,150)	($320,890)	($353,000)	($381,420)	($406,480)	($427,540)	($446,040)	($463,810)
Operating Cashflow		$582,903	$649,969	$704,567	$754,195	$798,923	$839,783	$875,723	$905,245
Net Working Capital									
Initial NWC	-$516,830								
Increases in NWC		$355,880	-$19,239	-$17,940	-$16,701	-$15,521	-$14,396	-$13,325	-$12,305
NWC Recovery									$270,380
Changes in NWC	-$516,830	$355,880	-$19,239	-$17,940	-$16,701	-$15,521	-$14,396	-$13,325	$258,075
Capital Spending									
Initial Outlay	-$110,450								
Aftertax Salvage									$14,579
Capital Spending	-$110,450								$14,579

Assumptions: End of Life value of Capital Purchases = 20%

Projected Total Cash Flows

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017
Operating Cash Flow		$582,903	$649,969	$704,567	$754,195	$798,923	$839,783	$875,723	$905,245
Changes in NWC	-$516,830	$355,880	-$19,239	-$17,940	-$16,701	-$15,521	-$14,396	-$13,325	$258,075
Capital Spending	-$110,450								$14,579
Total Project Cash Flow	-$627,280	$938,783	$630,730	$686,627	$737,494	$783,402	$825,387	$862,398	$1,177,899
Cumulative Cash Flow	-$627,280	$311,503	$942,233	$1,628,860	$2,366,354	$3,149,756	$3,975,143	$4,837,541	$6,015,440
Discounted Cash Flow @ X%	**-$627,280**	**$782,319**	**$438,007**	**$397,354**	**$355,659**	**$314,832**	**$276,420**	**$240,679**	**$273,942**

Discount Rate X =	**20.00%**
Net Present Value (X%) =	**$2,352,350**
IRR =	**129%**
Payback =	**Oct-10**

Appendix D - Fuel Savings Calculation for Embraer ERJ-190

Average Yearly Operating Hours (8hrs/day) = 2920 hrs/year
Average Speed = 500 mph
ERJ-190 Fuel Capacity = 4268 gallons
Min. Payload = 15,000 lbs.
Max. Payload = 25,000 lbs.
Max. Range = 2700 miles @ Min. Payload
Min. Range = 1500 miles @ Max. Payload
Yearly Distance Flown = Op. Hours x Average Speed = 1.460 million miles/year
Fuel Economy = Average Range/Fuel Capacity = 0.492 mpg
Fuel Cost = $2.00/gallon

Based on the linear Range and Payload relationship, for each 8.33 lb. decrease from Max. Payload gains 1 miles in range.

Based on the Yearly Distance Flown and assuming the average flight is 2100 miles, then 695 segments are flown per year. If coffee maker weight is reduced by 3 lbs (1.5 lbs per coffee maker), then yearly range increase is 3/8.33 x 695 = 250.3 miles/year.

Total Yearly Savings = yearly range increase/fuel economy x fuel cost = 250.3/0.492 x $2 = $1010

Appendix E - Previous XYZ Coffee Maker Projects Time to Completion

Project Number	Description	Time to Completion (Months)
XXXXXX	Coffee Maker – Boeing 777	5.8
XXXXXX	Microwave– Boeing 767	6.4
XXXXXX	Coffee Maker – Airbus A320	7.9
XXXXXX	Coffee Maker – MD-80	8.3
XXXXXX	Microwave – Boeing 737	10.5
XXXXXX	Coffee Maker – Boeing 777	11.8

Mean: 8.45 months
Median: 7.9 Months
Range: 5.8 to 11.8 Months

Appendix F - Embraer ERJ-190 IPC

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Appendix G - XYZ Develop Process Flowchart

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Appendix H - Competitor PMA Supplements

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Appendix I - Acronyms & Definitions

ACO – FAA Aircraft Certification Office: FAA field office that serves a specific geographic area in the United States for guidance on aircraft certification and FAA-PMA design approval. There are 10 ACO offices located throughout the United States, and the XXX City location will have jurisdiction over activities defined in this plan.

AOG – Aircraft On Ground: Aircraft is not able to pass pre-flight safety inspection. For purposes of this project, references situation when cabin air filters exceed dirty pressure drop threshold and require replacement with new filters.

CFD - Computational fluid dynamics: one of the branches of fluid mechanics that uses numerical methods and algorithms to solve and analyze problems that involve fluid flows.

FAA – Federal Aviation Administration: an agency in the Department of Transportation that is responsible for the safety of civilian aviation.

FAA DER – FAA Designated Engineering Representative: an individual designated by a local FAA ACO office to act on their behalf in matters regarding design approval for aircraft certification activities and FAA-PMA design approval.

FAA DMIR – FAA Designated Manufacturing Inspection Representative: an individual designated by a local FAA MIDO office to act on their behalf in matters regarding manufacturing inspection, including final inspection of products.

FAA-PMA – FAA Parts Manufacturing Authorization: authorization granted by the FAA to produce legitimate aftermarket replacement parts for use in aviation. Involves both design approval by the local ACO office and manufacturing and inspection system approval by the local MIDO office.

FAA-proto – Prototype components procured during FAA-PMA product development that is eligible for use in test units during design approval with the ACO.

IPC – Illustrated Parts Catalog: document written by aircraft OEM that airlines use to identify parts that are certified for use in their aircraft.

MIDO – FAA Manufacturing Inspection District Office – FAA Field office that serves a specific geographic area in the United States that oversees and approves manufacture and inspection of aircraft and aviation

components. There are 10 MIDO offices located throughout the United States, and the XXX City location will have jurisdiction over activities defined in this plan.

OEM – Original Equipment Manufacturer: manufacturer of an aircraft or equipment supplied on new aircraft.